

“Final Project Report to the NYS IPM Program, Agricultural IPM 2002–2003.”

1. Title:

Implementing a Management Program for Phytophthora Blight of Cucurbits

2. Project Leader(s):

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cucurbit growers in each participating county

4. Type of grant:

Cultural methods; sanitation; physical controls

5. Project location(s):

Ontario, Monroe and Schoharie counties

6. Abstract:

Phytophthora blight is a very devastating disease that sometimes results in total crop loss. It has been increasing in importance and thus is a high priority for the IPM program. The goal of this project was to continue to work with growers in upstate New York to implement management practices identified through research conducted on Long Island. Current recommendations center around preventing the pathogen from being moved into a new field and managing soil moisture to avoid saturated conditions which favor disease onset. Fourteen fields were selected for the study on commercial farms where blight has been a problem. Management practices implemented include: selecting fields with no history of blight (13 fields), selecting fields that were not planted to a susceptible crop in 2000 or 2001 (11 fields), deep ripping between rows to improve soil drainage (8 fields), no-till production into rye+hairy vetch+clover to obtain a straw mulch barrier (1 field), and applying compost to improve drainage and increase microbial activity (1 field). Weather conditions were very dry during the summer of 2002 and thus not favorable for Phytophthora blight, which was fortunate for the growers but unfortunate for studying management practices. Blight only developed in 1 of the 14 fields. Symptoms had not been observed in this field previously, but it was next to a field where blight had occurred in 1999, pickling cucumbers were grown in the field in 2001, and deep ripping was not used to improve drainage. Symptoms were observed near the irrigation reel where soil was wetter than the rest of the field. This further documents the importance of wet soils for blight development. An additional component of this project was to further extend information to growers about Phytophthora blight and its management. This was done through newsletters, one-on-one visits, field meetings, the Capital District Vegetable Seminar, and regional conferences including the 2002 NYS Vegetable Conference.

7. Background and justification:

Phytophthora blight can strike any time from planting through harvest, affecting leaves, stems, and fruit. Often it does not strike until near harvest after growers have invested a lot of time

and resources into the crop. This devastating disease has been described as 'like the plague' and the 'most destructive disease of cucurbits' because 'nothing causes greater loss'. Total crop loss has occurred in some fields. Within the past 20 years it has gone from being unknown to a serious problem, first on Long Island and in the Capital District, then within the past few years in central and western New York.

Current recommendations center around preventing the pathogen from being moved into a new field and managing soil moisture to avoid saturated conditions which favor disease onset. Prevention is very important because *Phytophthora* blight is difficult to control once it starts, and after it has occurred on a farm it is challenging to continue growing susceptible crops without *Phytophthora* blight reoccurring. In addition, it is very difficult to suppress this disease once it starts to develop in a field. Several years of research in Riverhead documented that the fruit rot phase cannot be controlled adequately with fungicides, especially when used without other practices.

To improve management of *Phytophthora* blight in upstate New York, we have been working with growers to implement the management program developed through years of research and observations on Long Island. Weather conditions were generally not favorable for *Phytophthora* blight in 2001, the first year of this project. Practices evaluated in 2001 in part of the grower/cooperator fields included deep ripping/chisel plowing before planting and subsoiling after planting to improve drainage; application of the fungicide Acrobat (Section 18 was obtained for 2001); straw mulch at one farm and plastic mulch in the row plus straw or living mulch between rows and crown setting varieties. Other practices implemented for the entire field included rotation, sanitation, selecting well-drained soils, avoiding over irrigation, and switching from potentially contaminated irrigation pond water. Blight only developed in 1 of 3 fields on the commercial farms where these management practices were evaluated. In that field blight was less where straw was used.

Efforts to educate growers have had an impact. Managing *Phytophthora* blight was the topic of a grower newsletter and several presentations at grower meetings prior to the 2001 growing season. These activities were part of the previous IPM Implementation project. Growers were also surveyed about management practices during these meetings. Chisel plowing and subsoiling are used more frequently by growers now. Valuable information was obtained about the management practices being used through the surveys. There is a need for additional educational activities. There are new pumpkin growers that need to learn about *Phytophthora*. Recently there has been a 50% increase in the number of vegetable growers in Schoharie Co., mostly due to dairy farmers starting to grow pumpkins.

8. Objectives:

1. Discuss the recommended management practices with growers during winter meetings.
2. Examine several farms during the growing season to determine practices being implemented and occurrence of *Phytophthora* blight.
3. Evaluate project results.

9. Procedures:

1. The project leader gave a presentation on 'Managing *Phytophthora* in Pumpkins' at the 2002 NYS Vegetable Conference. Recommended management practices were discussed with growers during winter meetings.
2. Fields were selected that were to be planted to pumpkin or pickling cucumbers and that differed in previous history of blight and management practices used.

ONTARIO, WAYNE, YATES AND STEUBEN COUNTIES

Ten fields were selected at the farm in this area that has been battling Phytophthora blight for a few years (Ontario County). Blight had not been observed previously in any of these fields. Selecting a field with no previous history of blight is an important management practice for all fields. These fields however were all near fields where blight had occurred. This grower uses good sanitation practices to minimize the potential for the pathogen to be moved between fields in soil. Additionally to manage blight the grower strives to rotate cucurbit crops with non-susceptible crops and to use deep ripping between rows to improve soil drainage. Not all fields had been rotated out of cucurbits crops the past three seasons and not all were deep ripped in 2002 providing an opportunity to evaluate these practices. Additional information on these fields is in the Results Section.

LAKE PLAINS REGION

Three fields were selected that have not had Phytophthora blight in Monroe County where blight has previously been a major problem. These fields have been on a good rotation program with no cucurbit crops over the past 7 years. These are important management practices for Phytophthora blight. One field had a cover crop incorporated before planting. Another field was planted no-till. The cover crop was rye + hairy vetch + clover. It was rolled down and killed with herbicide before planting. There was a good, thick (about 3-inch) layer of straw separating fruit from soil. The last field was planted conventionally into bare ground. Subsoiling was not done in any of these fields.

CAPITAL DISTRICT

The selected field has been used to grow pumpkins continuously for three years and Phytophthora blight has occurred there. Compost was applied in a portion of this field in 2001 to assess whether this practice, which can improve soil drainage and increase microbial activity, is effective for managing blight.

3. Project results were evaluated by comparing what occurs among the different sections of each field and among the different fields examined. Results were discussed with these growers. Results were also shared with other growers during grower meetings.

10. Results and discussion:

RESULTS - ONTARIO, WAYNE, YATES AND STEUBEN COUNTIES

The 2002 growing season started wetter and colder than normal making it difficult to get crops planted. The weather abruptly changed to hot and dry at the end of June and remained drier than normal for the rest of the season. Phytophthora was not much of a problem in 2002 probably as a result of the weather. Another factor may have been the practice of deep ripping between the rows, which was done in all pumpkin fields but not in pickle fields. No Acrobat or Ridomil were used. The pickle fields were irrigated twice from ponds. The pumpkins were not irrigated. This grower tries to plant a susceptible crop like pumpkins, pickles, etc. no more than once every 3 – 4 years and uses new land when possible. The wet spring interfered with those plans in some cases. The following fields were scouted every couple of weeks and/or after a significant rain.

<u>Field</u>	<u>Date Planted</u>	<u>Crop:Variety</u>	<u>Rotation (2001/2000/1999)</u>
Vogt Rd. North	5/23	Pumpkin: Merlin	field corn/ field corn/ snap beans
Kennedy Lane	5/28	Pumpkin: Merlin	pickles /field corn/ pickles
Algerine Muck	5/29	Pumpkin: Howden	1 st year rented – potatoes/ corn?
Sutton Rd. North	6/3	Pumpkin, Squash	soybeans/ field corn/ field corn
Sutton Rd. South	6/10	Pumpkin: Howden, Squash	soybeans/ field corn/ pumpkin -corn
PreEmption South	6/3 6/10	Pumpkin: Merlin, Tom Fox, Howden	soybeans/ unplanted/ corn-soybeans soybeans/ unplanted/ corn-soybeans
PreEmption North	6/3	Pumpkin: Howden	field corn/ wheat/ pickles
Meeks	6/13	Pumpkin: Racer	horse pasture
Whitney/Co Rd 4	7/11	Pickles: Vlaspik, west LaFayette, east	pickles /snap beans/ wheat/ snap beans
Tileyard Rd.	7/11	Pickles: Vlaspik	wheat/ pickles / corn/ cauliflower

The only place where Phytophthora was detected (8/31) and confirmed (9/3) was in the Whitney Rd./ County Road 4 pickle field. A neighboring field had Phytophthora in 1999. The infection was detected near the spot where the irrigation reel was located and was wetter than the rest of the field. This further documents the importance of wet soils for blight development. The infection occurred late enough so that the crop was not affected. The weather, deep ripping in the pumpkins, rotation and the wet spot from the irrigation reel may all have affected the incidence of Phytophthora on the farm in 2002.

RESULTS - CAPITAL DISTRICT

Pumpkins did well both in the portion of the field that was amended with compost and in the portion that did not receive compost. Phytophthora blight was not observed. The grower elected not to irrigate from a pond that might have been a source of past infestations.

RESULTS - LAKE PLAINS REGION

Phytophthora blight did not develop in any of the fields most likely due to the dry, unfavorable conditions. Blight was only observed in one field in this area in 2002.

An additional component of this project was to further extent information to growers about Phytophthora blight and its management. This was done through weekly newsletters, one-on-one visits, field/ twilight meetings, the Capital District Vegetable Seminar, and regional conferences including the 2002 NYS Vegetable Conference.

DISCUSSION

Interactions with growers during the 2-years of this project has increased their knowledge about Phytophthora blight and it has had an impact on grower management practices, particularly for growers who have had problems with Phytophthora blight. Growers are much more aware of the potential of this disease to cause damage. They are better at identifying blight and differentiating it from Fusarium. They know more about the kinds of conditions that are favorable for disease development. They know more about the value of rotation. They have expressed an interest in learning more about the value of cultural practices, in particular they have asked about the potential of raised beds with mulches between the row, no-till / mulch systems, and compost for combating the disease.

Growers are using longer rotations. Rotation is the primary management strategy for many. Different types of deep tillage equipment are being used to improve soil drainage, including sub-soilers and deep chisel plows. Some growers are deep ripping between rows. To obtain a barrier between soil and pumpkin fruit as well as to improve soil quality and drainage, a few growers are trying reduced-tillage / cover cropping systems with killed rye or alfalfa residues. Adoption of management practices is good among growers who have experienced Phytophthora blight. Some who have not had the disease on their farm yet cannot appreciate its potential seriousness. While numerous growers have improved their pumpkin rotations as a result of this project, others feel forced to use the same fields for reasons having to do with marketing (e.g. pick-your-own field) or limited land-base.

When asked to comment on their experiences and on our project, growers have expressed an interest in seeing the project continue because Phytophthora blight can be severe. They have been impressed with yield increases owing to the use of raised beds and black plastic mulch and from the use of compost. Unfortunately it has not been possible to judge the efficacy of these strategies for suppressing Phytophthora because the disease has not been observed in pumpkin fields where these strategies have been examined during the last two years. Growers recognize the benefit of early detection through scouting. When they know a field is affected, they can focus on preventing spread on equipment and disking the affected area is a feasible practice early in development.

Growers are interested in having more research conducted on managing Phytophthora blight. We've been successful in elevating grower awareness about the cause and nature of the disease; now more work is needed on devising and demonstrating effective control strategies. Specifically there is interest in research on chemical control, biological control and assessing pathogen occurrence in soil.

Practices for managing Phytophthora blight vary in cost of implementation. Two practices with low cost are rotation and deep tillage to improve drainage. Rotation can be indirectly costly for growers whose pumpkin production is tied to certain fields because of marketing or who have limited land. Reduced tillage and cover cropping is reasonable for some, but changing to a no-till system can be expensive for those who do not have a no-till planter, and this requires a major change in cultural practices. Straw is not economical unless the grower is already handling it and the acreage is small.